

(LOOKING WEST)

BURNER ARRANGEMENT (FRONT WALL)						IGNITOR POSITION					
400E	400E	400E	400E	400E	400E	401E	401E	401E	401E	401E	401E
300A	300A	300A	300A	300A	300A	301A	301A	301A	301A	301A	301A
200F	200F	200F	200F	200F	200F	201F	201F	201F	201F	201F	201F
100B	100B	100B	100B	100B	100B	101B	101B	101B	101B	101B	101B

BOILER DRAIN CONNS			BOILER VENTS		
NO.	QUAN.	SIZE	NO.	QUAN.	SIZE
3	1	3" ECON INLET HOR	5	1	1" ECON DISCHARGE LINE (WEST)
4	1	1" ECON DISCHARGE LINE (EAST)	6	1	1" ECON DISCHARGE LINE (EAST)
5	1	2" DOWNCOMER - BLOWOFF MANIFOLD	34	1	1" SSH PLATEN OUTLET HOR
30	1	3" DOWNCOMER - END (WEST)	35	1	1" SSH INLET (WEST)
31	1	3" DOWNCOMER - END (EAST)	36	1	1" SSH OUTLET (EAST)
20	1	3" DOWNCOMER - SHELL (WEST)	82	3	1" SEC SH OUTLET PIPE
22	1	3" DOWNCOMER - SHELL (EAST)	87	2	1" REHEAT OUTLET PIPE
23	1	3" DOWNCOMER - SHELL (CENTER)			
50	1	1" ROOF INLET HOR			
56	2	3" LOWER CONV PASS HOR (WEST)			
58	2	3" LOWER CONV PASS HOR (EAST)			
80	1	1" SSH PLATEN INLET HOR			
82	1	1" SSH INTERM INLET HOR (UPPER)			
83	1	1" SSH INTERM INLET HOR (LOWER)			
84	1	1" SSH OUTLET HOR			
100	1	1" REHEAT INLET HOR			
104	1	1" REHEAT OUTLET HOR (FRONT)			
105	1	1" REHEAT OUTLET HOR (REAR)			
113	1	1" DRUM WATER GAUGE			

ACID CLEANING CONNS			MISC CONNS		
NO.	QUAN.	SIZE	NO.	QUAN.	SIZE
1	1	5" DOWNCOMER - END (WEST)	5	1	1 1/2" CONT. BLOWDOWN CONTROL (OPER. FLOOR LEVEL)
2	1	5" DOWNCOMER - END (EAST)			
3	1	5" DOWNCOMER - SHELL (WEST)			
4	1	5" DOWNCOMER - SHELL (EAST)			
5	1	5" DOWNCOMER - SHELL (CENTER)			

BOILER TUBES (FURN)			WALL TUBE DATA			
NO.	OD	CTRS	DESIGNATION	NO.	OD	CTRS
170	3"	6"	ROOF TUBES (FURN)	170	3"	6"
206	1 1/2"	4 1/2"	ROOF TUBES (CONV. PASS)	206	1 1/2"	4 1/2"
339	2 1/2"	3"	FURN. FRONT WALL	339	2 1/2"	3"
339	2 1/2"	3"	FURN. REAR WALL	339	2 1/2"	3"
226	2 1/2"	3"	FURN. SIDE WALL	226	2 1/2"	3"
254	2 1/2"	4"	FURN. ARCH	254	2 1/2"	4"
47	1 1/2"	4"	PENDANT SIDE WALL	47	1 1/2"	4"
47	1 1/2"	12"	FURN. FRONT SCREEN	47	1 1/2"	12"
254	2 1/2"	8"	FURN. REAR SCREEN	254	2 1/2"	8"
339	1 1/2"	3"	CONV. PASS FRONT WALL	339	1 1/2"	3"
226	1 1/2"	4 1/2"	CONV. PASS REAR WALL	226	1 1/2"	4 1/2"
131	1 1/2"	4 1/2"	CONV. PASS SIDE WALL	131	1 1/2"	4 1/2"
110	2 1/2"	4"	CONV. PASS SCREEN	110	2 1/2"	4"
339	1 1/2"	3"	CONV. PASS BAFFLE WALL (LOWER)	339	1 1/2"	3"
339	1 1/2"	3"	CONV. PASS BAFFLE WALL (UPPER)	339	1 1/2"	3"
110	2 1/2"	8"	CONV. PASS BAFFLE WALL SCREEN	110	2 1/2"	8"

NOTE:

(1) ODS NUMBERED M IN BOOTBLOWERS (L.H. SIDE) EVEN NUMBERS (R.H. SIDE)

(2) UPPER NUMBERED IN BOOTBLOWERS (L.H. SIDE) LOWER NUMBERS (R.H. SIDE)

1, 2, 3, 4, 5, 6, 7, 8, 9, 10, 11, 12, 13, 14, 15, 16, 17, 18, 19, 20, 21, 22, 23, 24, 25, 26, 27, 28, 29, 30, 31, 32, 33, 34, 35, 36, 37, 38, 39, 40, 41, 42, 43, 44, 45, 46, 47, 48, 49, 50, 51, 52, 53, 54, 55, 56, 57, 58, 59, 60, 61, 62, 63, 64, 65, 66, 67, 68, 69, 70, 71, 72, 73, 74, 75, 76, 77, 78, 79, 80, 81, 82, 83, 84, 85, 86, 87, 88, 89, 90, 91, 92, 93, 94, 95, 96, 97, 98, 99, 100, 101, 102, 103, 104, 105, 106, 107, 108, 109, 110, 111, 112, 113, 114, 115, 116, 117, 118, 119, 120

FUTURE IN BOOTBLOWERS

2, 4, 6, 8, 10, 12, 14, 16, 18, 20, 22, 24, 26, 28, 30, 32, 34, 36, 38, 40, 42, 44, 46, 48, 50, 52, 54, 56, 58, 60, 62, 64, 66, 68, 70, 72, 74, 76, 78, 80, 82, 84, 86, 88, 90, 91, THRU 120

FUEL AS FIRED										PREDICTED PERFORMANCE										EQUIPMENT PER UNIT									
SAMPLES										3965										TYPE									
ANALYSES										3250										RADIANT									
CLASS										PERF. COAL PER COAL PER COAL PER COAL										RBC									
GROUP										652										DESIGN PRESSURE (PSI/HR) - 2975 PSIG/750 PSIG									
SPEC										22										WATER COOLED SURFACE (CIRCUMFERENTIAL)									
NAME										42										WATER COOLED (PROTECTED)									
CLASSIFICATION										5494										SUPERHEATER (PERIPHERAL) 34" CENTERLINE									
SPECIFICATION										5261										SUPERHEATER (PERIPHERAL) 24" CENTERLINE									
LOCATION										6.3										SUPERHEATER (PROTECTED)									
STATE										5255										TOTAL SURFACE HEATING SURFACE									
UTAH										477.3										SATURATED (CIRCUMFERENTIAL)									
1-5/8" x 0 - 5/8" x 0										5274										SUPERHEATER (CIRCUMFERENTIAL)									
55										4763										PREHEATER 1 (CIRCUMFERENTIAL)									
SURFACE MOISTURE, %										367										PREHEATER 2 (CIRCUMFERENTIAL)									
ASH SOLIDITY, % (MECHANICAL)										2440										TOTAL CONVECTION HEATING SURFACE									
2250										350										TOTAL FURN. & CONV. PRESSURE PART, HIG. SURF.									
18.8										16										TOTAL PROJECTED SURFACE HEATING SURFACE									
35.5										11										TO FACE OF CONVECTION SURFACE (12" CENTERLINE)									
37.9										68										FURNACE VOLUME, CU FT									
7.8										1005										TYPE: REGENERATIVE-SECONDARY									
100.0										1005										TOTAL HEATING SURFACE, SQ. FT.									
WT.										580										TYPE: REGENERATIVE-PRIMARY NO. 2-24-1/2 VI-44									
WT.										675										TOTAL HEATING SURFACE, SQ. FT.									
WT.										312/276										TYPE: DUAL REGISTER									
WT.										280/268										TYPE: NO. 46 (6 BURNERS PER PULVERIZER)									
WT.										490										CAPACITY OF 6 PULV. IS 6600 M.L.B. STEAM/HR. BASED ON 48 GRIND									
WT.										76/62										FOR 11.010 M.L.B. COAL/HR. AT 70.5 THRU 200 M.L.B. SIEVE									
WT.										375/624										FOR 11.010 M.L.B. COAL/HR. AT 70.5 THRU 200 M.L.B. SIEVE									
WT.										2.2										15.43. MINIMUM TOTAL MOISTURE IS 12.8 M.L.B. GRIND									
WT.										2.1										222 TOTAL MOISTURE COAL REQUIRES 340 P.AIR									
WT.										5.2										SUPERHEAT BY SPRAY ATTENUATION									
WT.										-0.3										REHEAT BY GAS BIASING									
WT.										1.0										MEMBRANE WALL									
WT.										1.1										BALANCE DRAFT									
WT.										1.1										INDOOR UNIT									
WT.										1.8										TOTAL HEAT LOSS									
WT.										4.92										TOTAL HEAT LOSS									
WT.										5.14										TOTAL HEAT LOSS									
WT.										0.07										TOTAL HEAT LOSS									
WT.										0.2										TOTAL HEAT LOSS									
WT.										0.24										TOTAL HEAT LOSS									
WT.										1.00										TOTAL HEAT LOSS									
WT.										11.57										TOTAL HEAT LOSS									
WT.										88.43										TOTAL HEAT LOSS									
WT.										0.01										TOTAL HEAT LOSS									
WT.										88.44										TOTAL HEAT LOSS									
WT.										88.55										TOTAL HEAT LOSS									
WT.										4										TOTAL HEAT LOSS									
WT.										71										TOTAL HEAT LOSS									
WT.										76										TOTAL HEAT LOSS									
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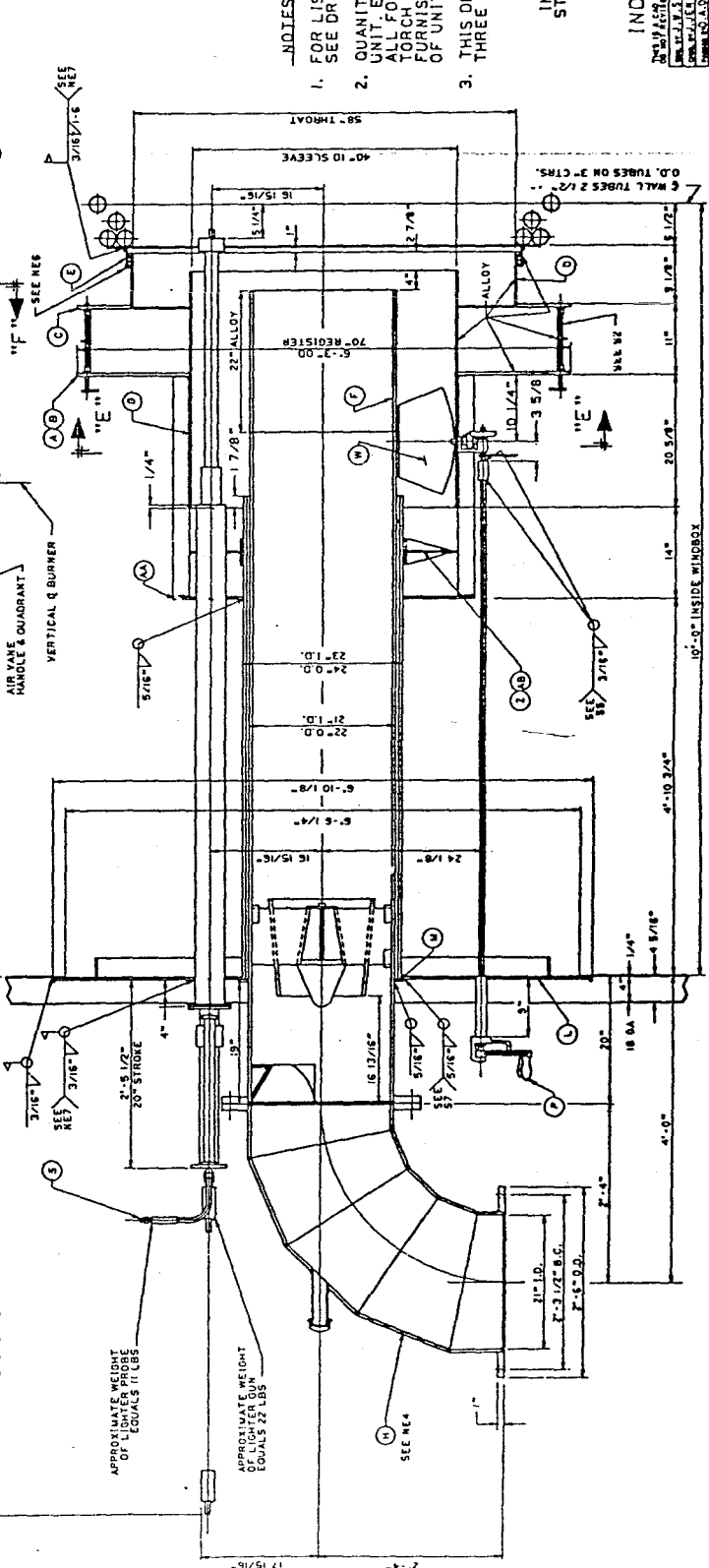
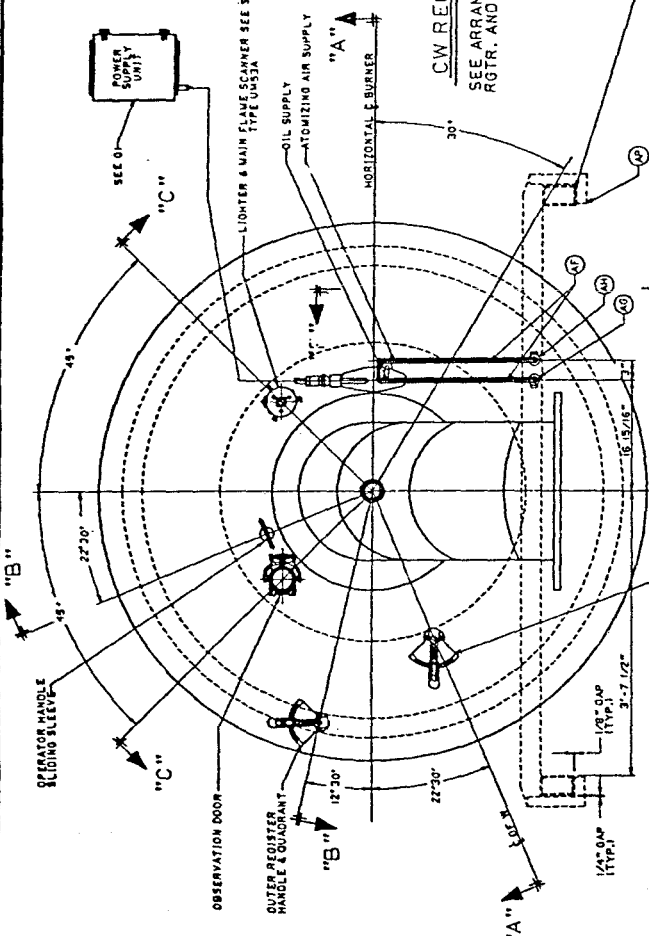
REFERENCE LIST	DESCRIPTION	QTY	UNIT	QTY	UNIT
1	UNIT REGISTER BURNER	1	EA	1	EA
2	UNIT REGISTER BURNER	1	EA	1	EA
3	UNIT REGISTER BURNER	1	EA	1	EA
4	UNIT REGISTER BURNER	1	EA	1	EA
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97	UNIT REGISTER BURNER	1	EA	1	EA
98	UNIT REGISTER BURNER	1	EA	1	EA
99	UNIT REGISTER BURNER	1	EA	1	EA
100	UNIT REGISTER BURNER	1	EA	1	EA

EIGHT 181 SETS OF LIGHTER MAINTENANCE TOOLS - ONE 111 SET PER BNR ROW

REV	DATE	DESCRIPTION
1	10/15/87	INITIAL DESIGN
2	11/15/87	REVISED FOR FABRICATION
3	12/15/87	REVISED FOR FABRICATION
4	1/15/88	REVISED FOR FABRICATION
5	2/15/88	REVISED FOR FABRICATION
6	3/15/88	REVISED FOR FABRICATION

CW REGISTER CW VANES SHOWN

SEE ARRANGEMENT DWGS. FOR DIRECTION OF RGTR. AND VANE AIR FLOW FOR ALL BURNERS



NOTES:

- FOR LIST OF REFERENCE DRAWINGS & NOTES SEE DRAWING NO. 197002C.
- QUANTITIES INDICATED ARE FOR ONE (1) UNIT. EQUIPMENT TO BE IDENTICAL FOR ALL FOUR (4) UNITS, EXCEPT FOR PLASMA TORCH LIGHTERS, WHICH ARE TO BE FURNISHED FOR THE LOWER BURNER LEVEL OF UNIT 1 ONLY. (B&W CONTRACT RB-614)
- THIS DRAWING REPRESENTS THE UPPER THREE BNR. ELEVATIONS FRONT & REAR WALL

INTERMOUNTAIN POWER PROJECT
STEAM GENERATOR UNITS 1,2,3 & 4
PROJECT FILE 9255.623401
IPA CONTRACT 2010N

21-58T-40S-70R INDOOR UNIT SUCTION FIRED

SECTIONAL ASSEMBLY	294359E6
DUAL REGISTER	
BURNER	
RB-0614	
RB-0617-33	

5-10008

SECTION "A-A"

ENGINE ROOM

LEGEND

- OIL LIGHTER TYPE OFA L.M. ARBY
- OIL LIGHTER TYPE OFA R.M. ARBY
- OBSERVATION DOOR
- LIGHTER - MAIN PLANE SCANNER
- YARD HANDLE & QUADRANT
- OUTER REG. HANDLE & QUADRANT
- OPERATOR HANDLE
- PLASMA ARC LIGHTER

FOR CONTINUATION OF CONTROL AIR TUBING TO LIGHTERS SEE DWG. 29340E

5-10017

REVISIONS			
#	DESCRIPTION	DATE	BY
1	CHECK ALL REF. #S AND CONTRACT REF. ADDS TO DIST. NAME		CLB/JAN
2	ADD PLANE DETECTOR IN NOTE 3	3/8/80	SBC/JJJ
3	CHG'D DIM. 4-5 TO 1-0 ZONE H-K CHG'D DIM'S IN ZONES B-1, B-9, C-1, D-1, E-1 & G-1 ADDED S/L DIM. 1-0 IN ZONE C-H	7/16/80	PCS JJJ
4	CHG'D DIM. 3-4 TO 1-0 IN ZONES B-1, B-9, C-1, D-1, E-1 & G-1 ADDED TABLE 1 REF TO TABLE IN NOTE 3 PER CLT ADDED TUBING NOTES IN ZONE C	10/2/80	R/L
5	REWORKED LC LDO PLAN CHG'D DRAWING TO COR. VERMILION NUMBER IN PLAN TO CHG'D NUMBER 1-17	1/17/82	W/S/E
6	CHG'D DIMS 3'-0" TO 3'-0" & 6'-0" UZ TO 8'-0" IN ZONE H-K CHG'D DIM 13' TO 8'-0" IN ZONE H-K ADDED STIES ON L/C PLV EN'S	4/16/83	B/L/E

TABLE 1			
FLAME DETECTOR		ASSIGNMENT	
CUSTOMER	TAG NUMBER	FLAME DETECTOR	ASSIGNMENT
BURNER	FLAME DETECTOR		
X2 B	X 504-XXX-42		
X2 B	" "	" "	43
X2 B	" "	" "	44
X2 B	" "	" "	45
X2 B	" "	" "	46
X2 B	" "	" "	47
X2 B	" "	" "	48
X2 B	" "	" "	49
X2 B	" "	" "	50
X2 B	" "	" "	51
X2 B	" "	" "	52
X2 B	" "	" "	53
X2 B	" "	" "	54
X2 B	" "	" "	55
X2 B	" "	" "	56
X2 B	" "	" "	57
X2 B	" "	" "	58
X2 B	" "	" "	59
X2 B	" "	" "	60
X2 B	" "	" "	61
X2 B	" "	" "	62
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X2 B	" "	" "	99
X2 B	" "	" "	100

NOTES:

1. FOR LIST OF REFERENCE DRAWINGS & NOTES SEE DWG NO.197002C.
2. EQUIPMENT FOR UNITS 1 THRU 4 IS TO BE IDENTICAL EXCEPT FOR PLASMA ARC IGNITERS WHICH ARE TO BE FURNISHED FOR THE LOWER BURNER LEVEL OF UNIT 1 ONLY. (BBW CONTRACT RB-614)
3. OWNER'S EQUIPMENT COMPONENT IDENTIFICATION IS AS INDICATED (E.G. 403E) AND IS TO BE PREFIXED AS FOLLOWS WHERE 'X' IS THE ASSOCIATED UNIT NO. 1 THRU 4.

BURNER	XSGA-BNR
FUEL OIL IGNITER	XSGE-IGN
PLASMA ARC IGNITER	XSGA-PTI
FLAME DETECTOR	SEE UNIT 1

4. FIRST DIGIT OF ROW DESIGNATION CORRESPONDS TO UNIT NUMBER.

(01)	(20)	(30)	(40)
UNIT 1	UNIT 2	UNIT 3	UNIT 4

INTERMOUNTAIN POWER PROJECT
STEAM GENERATOR UNITS 1,2,3 & 4
PROJECT FILE 9255.62.3401
IPA CONTRACT 2010N
INDOOR UNIT SUCTION FIRED

ARRANGEMENT
24 DUAL REGISTER
BURNERS
FRONT WA''

SENT BY J.M. BARNETT ONE ST. JAMES P.O. BOX 111 NEW YORK, N.Y. 10013 RB-614	ARRANGEMENT 24 DUAL REGISTER BURNERS FRONT WALL	THE BARNETT & WILSON CO. 1000 BROADWAY NEW YORK, N.Y. 10013 29437 E 6
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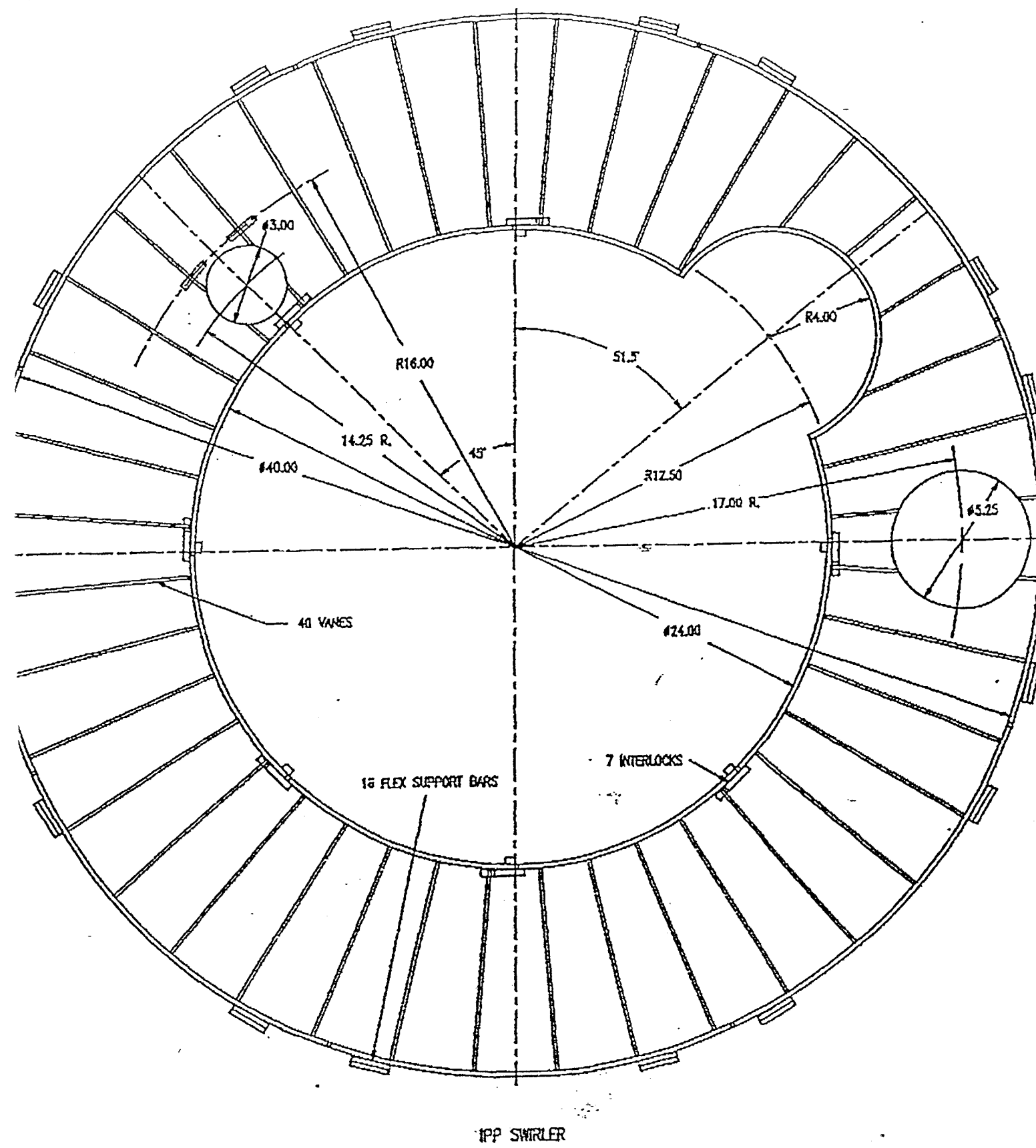


Figure 47 Intermountain Power Project Swirler

MZ Coal Flame Stabilizer

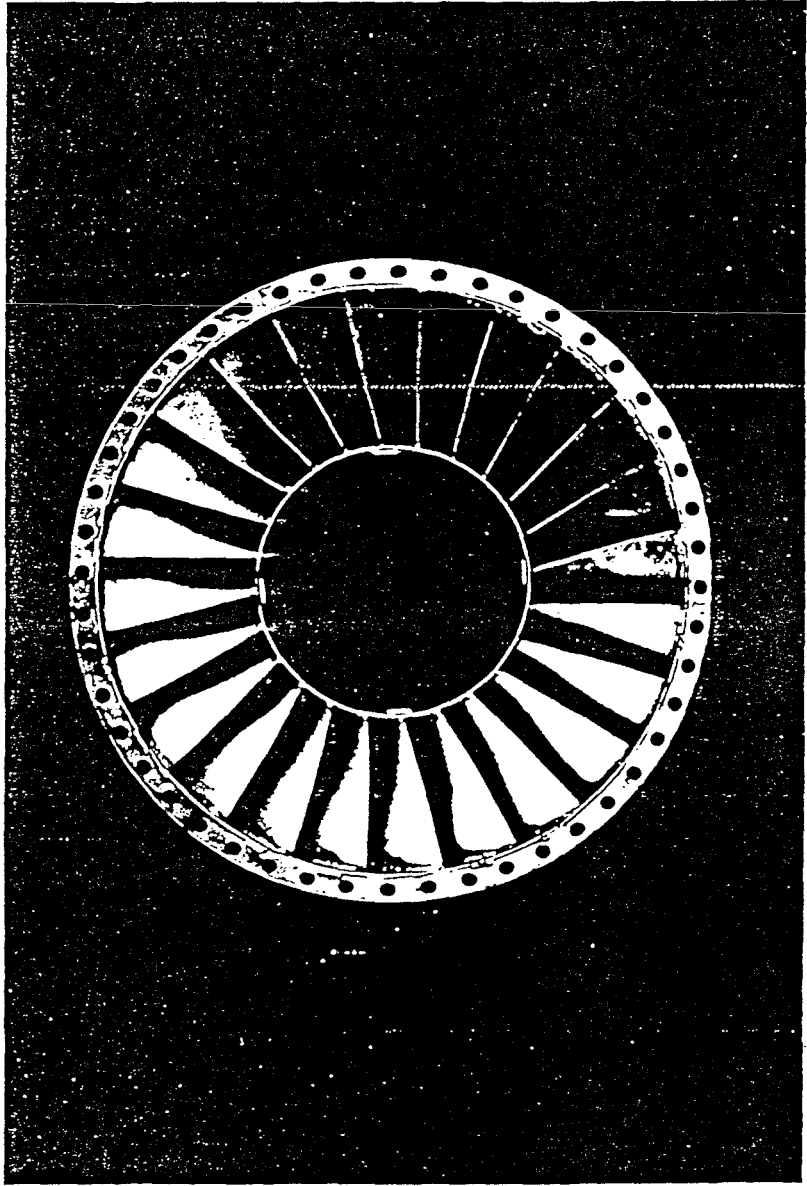


Figure 2

Correct Burner Flow Pattern

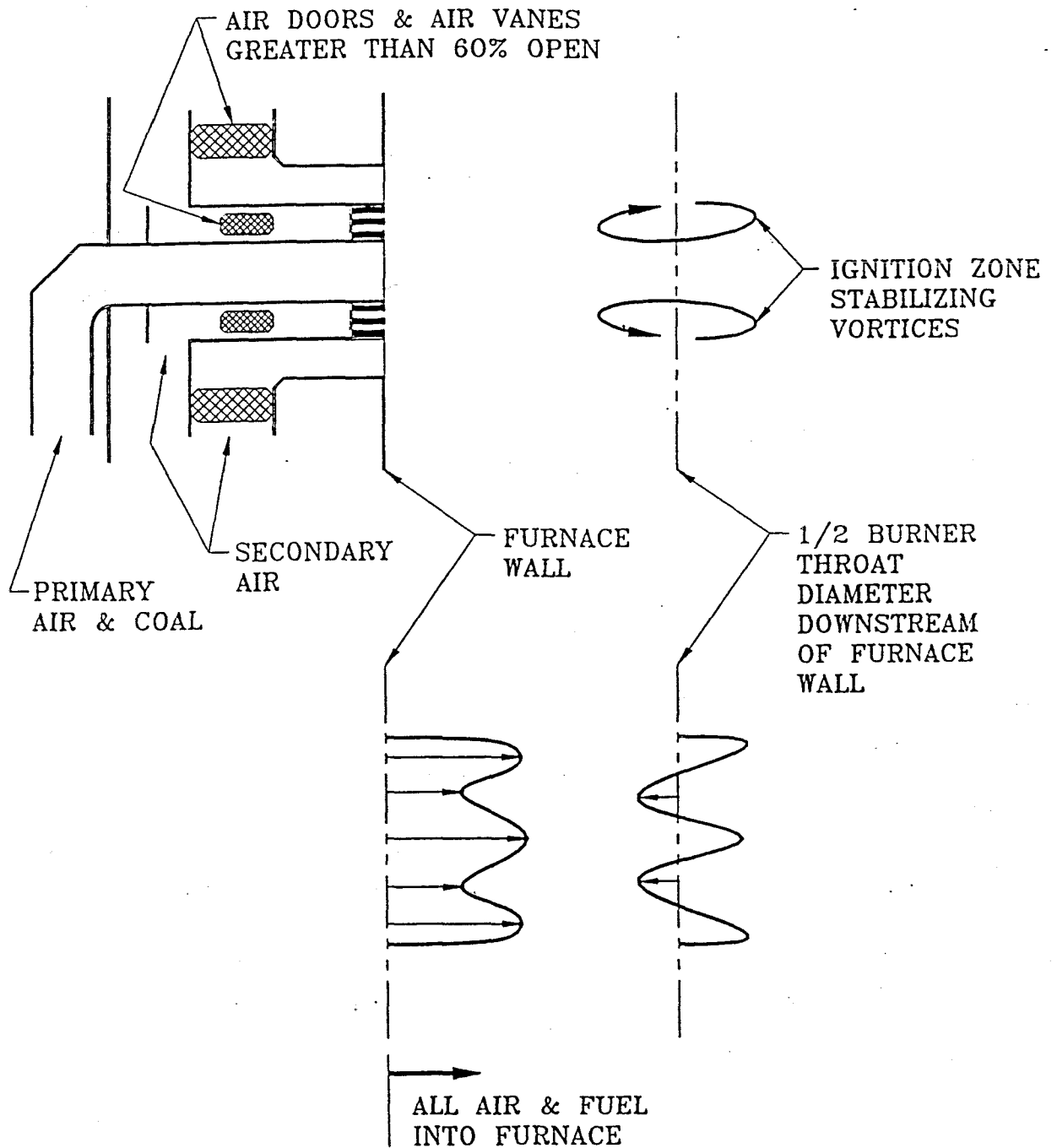


Figure 3

Burner Swirl vs. Eyebrow Formation

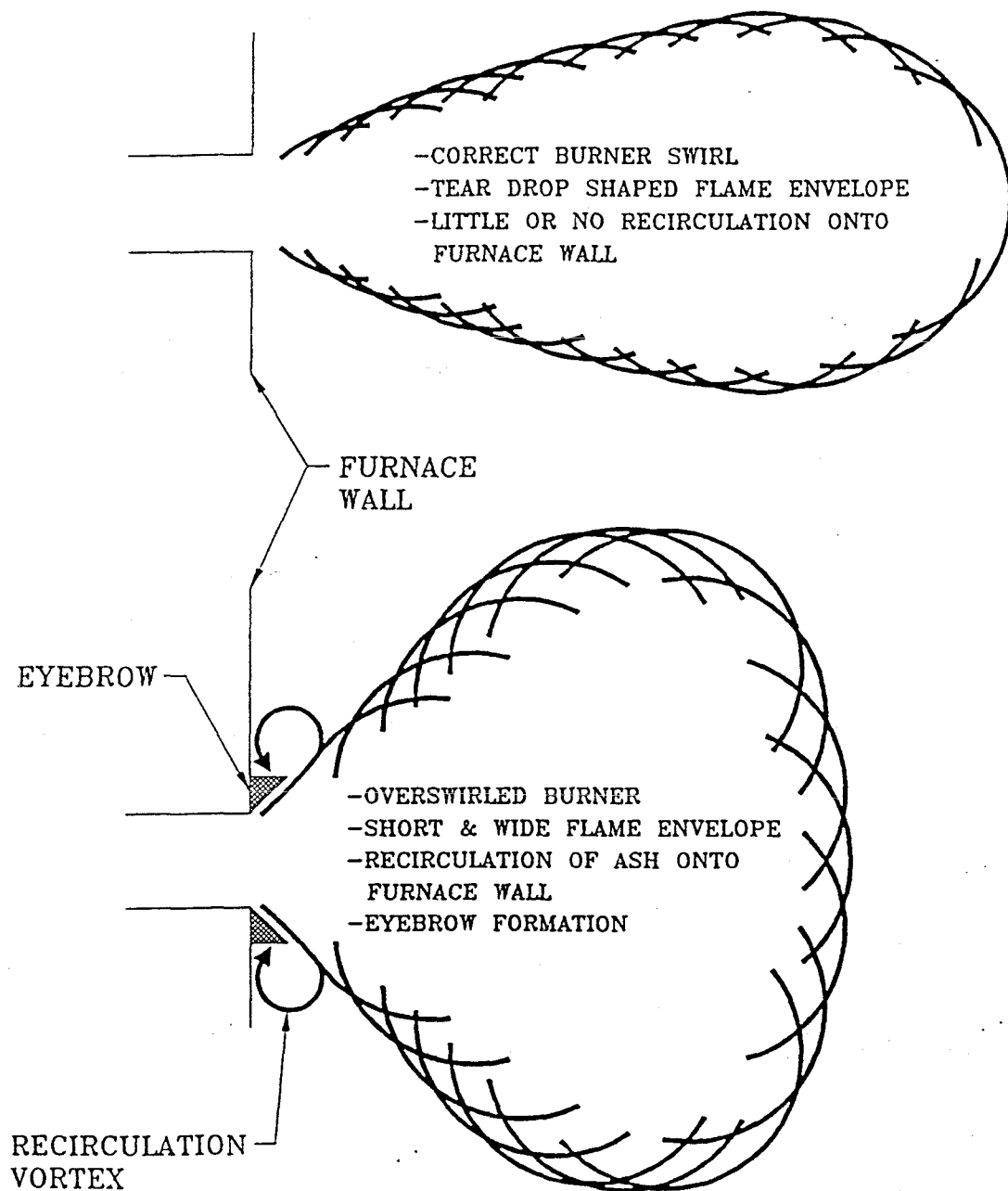


Figure 4

INTERMOUNTAIN POWER SERVICE CORPORATION

Engineering Test and Inspection Sheet

Sheet 1 of 5Equipment Burners and Windbox Unit # 2 Test/Inspect. Date Oct. 27-28, 1991Inspector Cecil James Responsible Engineer (Initials) _____

Item or Test	Observations/Comments	Recommendations
Extensive modifications performed this outage to all Unit 2 burners include:	<ol style="list-style-type: none"> 1) Remove 7 inches from the inner air sleeve tip 2) Remove 4 inches from the lighter shroud 3) Install an inner air stabilizer provided by RJM Corporation 4) Install a shroud around the outer air register 5) Install prescribed restrictors in selected burner lines <p>Modifications were implemented to improve air distribution and aerodynamics through the windboxes and burners. Stabilizers were installed to mitigate furnace gases from licking back into the burner throat area, see photos 1 - 3. Shrouds were installed to balance the air flow from burner to burner, see photo 4. RJM provided technical assistance and measuring instrumentation in the air flow balancing.</p> <p>All burner elbows, diffusers, and deflectors were removed for the air flow tests. Nozzle tip deformation was determined using a go-no go gauge to assure nozzle conformance for the stabilizer installation. Eleven nozzles were changed out for reasons stemming from severe distortion, holes at the tip, and weld seam cracking. All diffusers were measured for comparison with measurements taken the fall, 1990 Unit 2 outage. Results from the comparisons are included with this report. 37 of 48 diffusers had erosion holes in the top portion of the cone. A total of 24 diffusers were replaced.</p> <p>Twenty five burner lines received new or modified restrictor spools. Previous clean air flow tests indicated flow deviations as high as 11.2 percent. Restrictor change outs were performed to balance primary air within 5 percent. Restrictors were not made according to IPSC drawings. The restrictor exit did not have a 30 degree bevel, as recommended by B&W. Calculations found the pressure losses due to the abrupt enlargement to be negligible as compared to losses incurred with a 30 degree bevel, so the restrictors were installed in the as received condition.</p> <p>A windbox side inspection was conducted October 27 and 28, during which, the following items were examined:</p> <ol style="list-style-type: none"> a. Outer air registers b. Spin Vanes/ Backplate c. Register drive linkages d. Burner casing seal e. Thermocouples f. Windbox dampers g. Scanner sight tubes <p>The following information details burner defects and deficiencies found during inspections, diffuser inspection and diffuser strut (top and bottom) measurements, and restrictor modifications performed on each respective burner line.</p>	
B1	3/4" hole in cone. Top: 1-7/8", Bottom: 5-3/4" Restrictor changed to 18" ID.	New diffuser 11/91
B2	Ceramic diffuser. Top: 8-3/4", Bottom: 8-3/4"	

IP7_004573

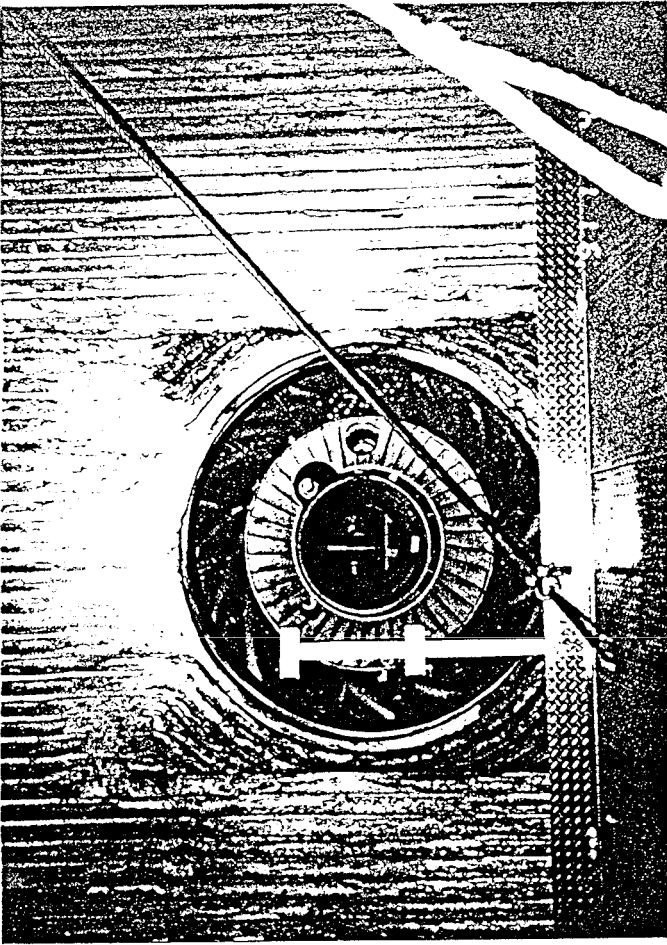


Photo #2: RDM Stabilizer.



Photo #4: Outer Air Register Shroud.

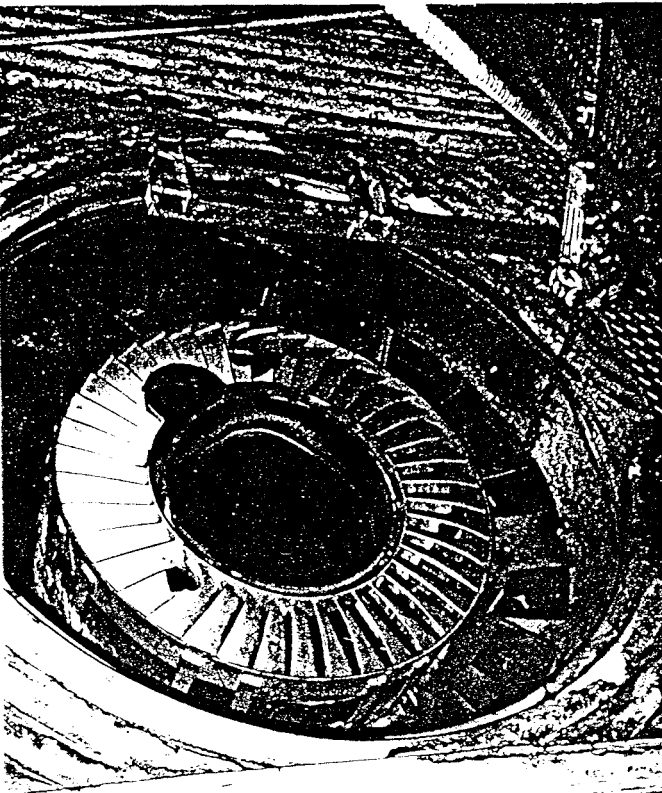


Photo #1: RDM Stabilizer.

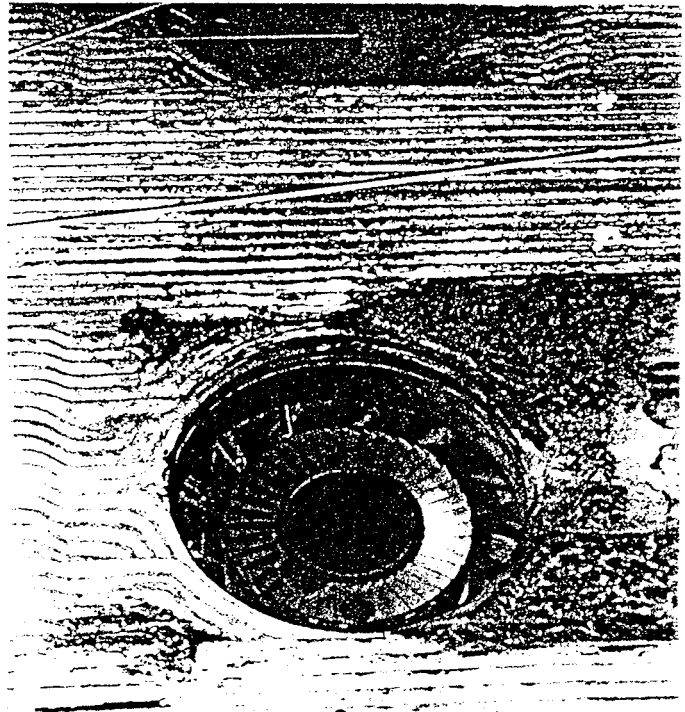


Photo #3: RDM Stabilizer.

INTERMOUNTAIN POWER SERVICE CORPORATION

Engineering Test and Inspection Sheet

Sheet 2 of 5Equipment Burners and Windbox Unit # 2 Test/Inspect. Date Oct. 27-28, 1991Inspector Cecil James Responsible Engineer (Initials) _____

Item or Test	Observations/Comments	Recommendations
B3	1/2" hole in cone. Top: 3-1/8", Bottom: 6-1/2" Restrictor changed to 18" ID.	New diffuser 11/91
B4	1-1/4" hole in cone. Top: 4-1/8", Bottom: 6-1/8"	New diffuser 11/91
B5	1-1/2" hole in cone. Top: 4-1/8", Bottom: 6"	New diffuser 11/91
B6	1/2" hole in cone. Top: 4-1/4", Bottom: 6-3/8"	
F1	1/8" hole in cone. Top: 5", Bottom: 7"	
F2	Outer register is warped, see photo 5. 3/8" hole in cone. Top: 5", Bottom: 7-1/4" Installed 20" ID restrictor.	
F3	1/4" hole in cone. Top: 3-1/2", Bottom: 6-1/4" Installed 20" ID restrictor.	New nozzle 11/91
F4	Isolation valve will not close 100 percent. See photo 6. Spin vane (7:00 position) is bent. 3/8" hole in cone. Top: 3-3/4", Bottom: 6-3/8"	Valve repaired 11/91 Spin vane replaced 11/91 New nozzle 11/91
F5	Spacer bar weld crack (10:00 position). Broken diffuser. Top: 4-1/4", Bottom: 6"	New nozzle 11/91 New diffuser 11/91
F6	1/4" hole in cone. Top: 3-3/4", Bottom: 6"	
A1	3/8" hole in cone. Top: 3-1/8", Bottom: 6-1/4" Installed new 20" ID restrictor.	New diffuser 11/91
A2	3/4" hole in cone. Top: 3-1/2", Bottom: 6-1/8" Restrictor changed to 18" ID.	
A3	Outer register vanes are seized up. Ceramic diffuser. Top: 8-5/8", Bottom: 8-3/4"	

IP7_004575

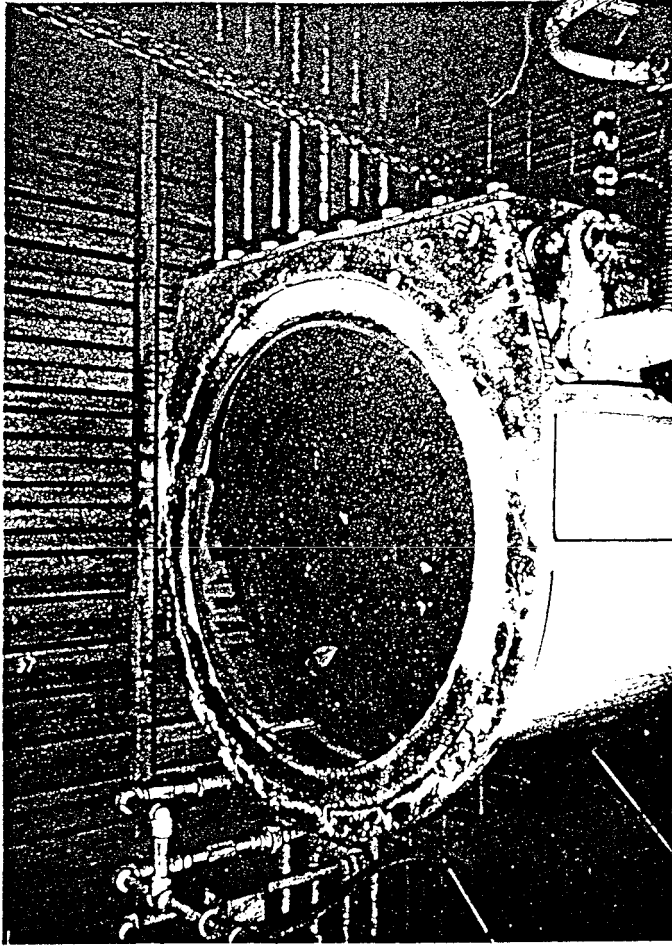


Photo #6: F4 - Isolation Gate fails to close 100 percent.

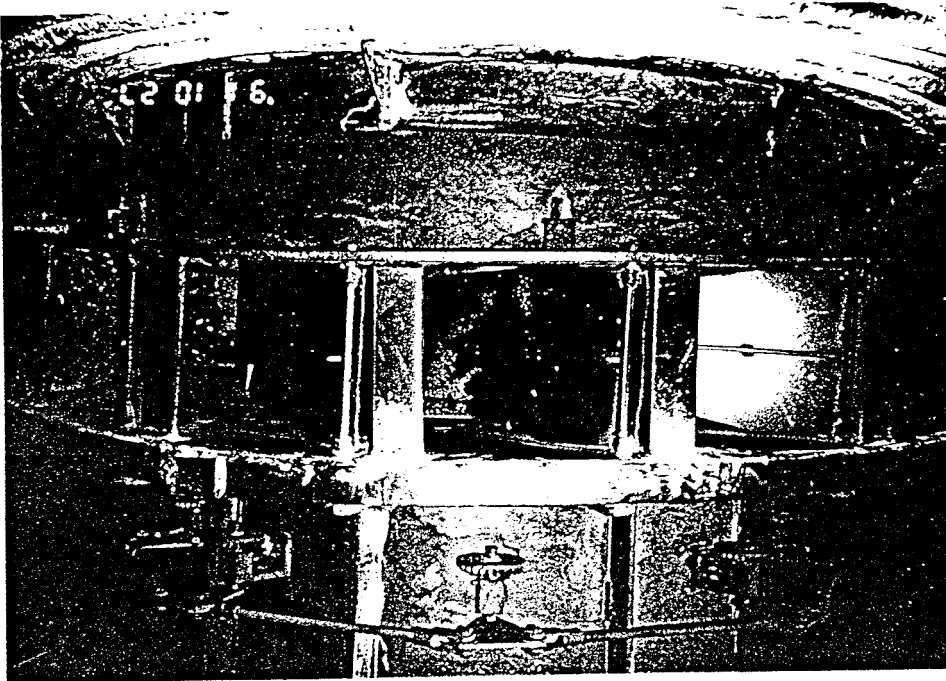


Photo #5: F2 Warped Outer Register.

INTERMOUNTAIN POWER SERVICE CORPORATION

Engineering Test and Inspection Sheet

Sheet 3 of 5

Equipment <u>Burners and Windbox</u>		Unit # <u>2</u>	Test/Inspect. Date <u>Oct. 27-28, 1991</u>
Inspector <u>Cecil James</u>		Responsible Engineer (Initials) _____	
Item or Test	Observations/Comments	Recommendations	
A4	Spin vanes will not open 100%. 1/8" hole in cone. Top: 3-1/4", Bottom: 6-7/8" Installed new 20" ID restrictor Nozzle had split weld seam and holes at tip. See photo 7.	New nozzle 11/91	
A5	Ceramic diffuser. Top: 8-5/8", Bottom: 8-5/8"		
A6	1-3/8" hole in cone. Top: 1-1/2", Bottom: 4-7/8"	New diffuser 11/91	
E1	Broken cone. Top: 2-3/4", Bottom: 6-3/8". Installed new 20" ID restrictor.	New diffuser 11/91	
E2	Ceramic diffuser. Top: 8-5/8", Bottom: 8-5/8"		
E3	Outer register vanes are seized up. Ceramic diffuser. Top: 8-1/2", Bottom: 8-5/8" Restrictor changed to 19" ID.		
E4	Outer register vanes are seized up. 1/2" hole in cone. Top: 3-1/4", Bottom: 5-3/4" Restrictor changed to 18" ID.	New diffuser 11/91	
E5	1-1/4" hole in cone. Top: 2-1/8", Bottom: 5-5/8" Restrictor changed to 18-1/2" ID.	New diffuser 11/91 New nozzle 11/91	
E6	No hole. Top: 3-3/4", Bottom: 5-7/8" Restrictor changed to 17-1/2" ID. Hole in nozzle wall adjacent to diffuser. See photo 8.	New nozzle 11/91	
G1	2" hole in cone. Top: 3-1/2", Bottom: 7"	New diffuser 11/91	
G2	2-3/4" hole in cone. Top: 2", Bottom: 6-7/8"	New diffuser 11/91	
G3	1/2" hole in cone. Top: 3-3/4", Bottom: 6-1/4"		
G4	1/8" hole in cone. Top: 1-1/2", Bottom: 6-1/2"	New diffuser 11/91	
G5	1/8" hole in cone. Top: 3-3/4", Bottom: 6-7/8" Restrictor changed to 19" ID.		

IP7_004577



Photo #7: A4 Nozzle tip is split and has holes.



Photo #8: E6-Hole in nozzle wall adjacent to diffuser.

INTERMOUNTAIN POWER SERVICE CORPORATION

Engineering Test and Inspection Sheet

Sheet 4 of 5

Equipment	<u>Burners and Windbox</u>	Unit # <u>2</u>	Test/Inspect. Date <u>Oct. 27-28, 1991</u>
Inspector	<u>Cecil James</u>	Responsible Engineer (Initials) _____	

Item or Test	Observations/Comments	Recommendations
G6	Ceramic diffuser. Top: 8-5/8", Bottom: 8-5/8"	
C1	1-5/8" hole in cone. Top: 4-1/2", Bottom: 6-1/2"	New diffuser 11/91
C2	Ceramic diffuser. Top: 8-1/2", Bottom: 8-3/4"	
C3	1/8" hole in cone. Top: 6-3/8", Bottom: 6-3/4"	
C4	3/8" hole in cone. Top: 4-1/4", Bottom: 6-3/4" Installed new 20" ID restrictor.	New nozzle 11/91
C5	1/4" hole in cone. Top: 3-7/8", Bottom: 6" Installed new 20" ID restrictor.	
C6	Spin vanes are bound up. Broken diffuser. Top: 2-7/8", Bottom: 6" Nozzle wall at alloy weld joint bulged approximately 1/2". See photo 9.	New nozzle 11/91 New diffuser 11/91
H pulverizer was ops recieving new rotating throats. During which, considerable ash accumulated in the nozzle tips. See photo 10.		
H1	1" hole in cone. Top: 2-7/8", Bottom: 5" Installed new 20" restrictor.	New diffuser 11/91
H2	Broken ceramic diffuser. Top: 8-3/8", Bottom: ?	New diffuser 11/91
H3	1-1/2" hole in cone. Top: 1-3/4", Bottom: 6-3/8" Installed new 20" restrictor.	New diffuser 11/91 New nozzle 11/91
H4	1-1/4" hole in cone. Top: 4-1/4", Bottom: 5-1/2" Restrictor changed to 18" ID.	New diffuser 11/91 New nozzle 11/91
H5	1-1/2" hole in cone. Top: 3", Bottom: 6" Restrictor changed to 17-1/2" ID.	New diffuser 11/91
H6	1" hole in cone. Top: 1-3/4", Bottom: 6-1/2" Restrictor changed to 17-1/2" ID.	New diffuser 11/91
D1	Spin vane gears (12:00 position) not meshing. 1/2" hole in cone. Top: 3-1/4", Bottom: 6-3/4" Restrictor changed to 17" ID.	New diffuser 11/91

IP7_004579



Photo #9: Nozzle wall bulges at alloy joint, C6.

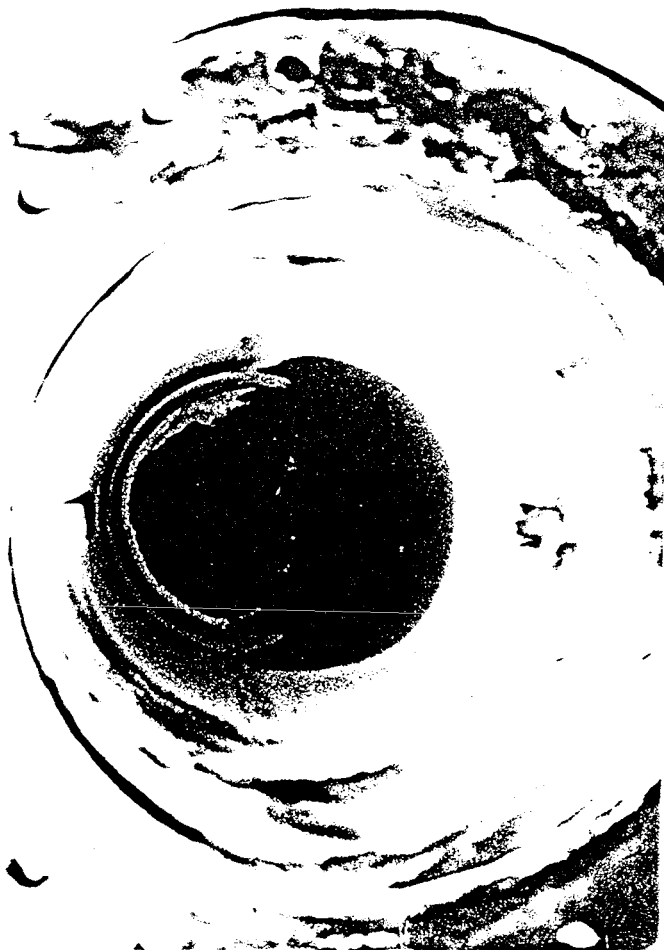


Photo #10: All H burners, Ash accumulated at nozzle tip in out of service burners.

INTERMOUNTAIN POWER SERVICE CORPORATION

Engineering Test and Inspection Sheet

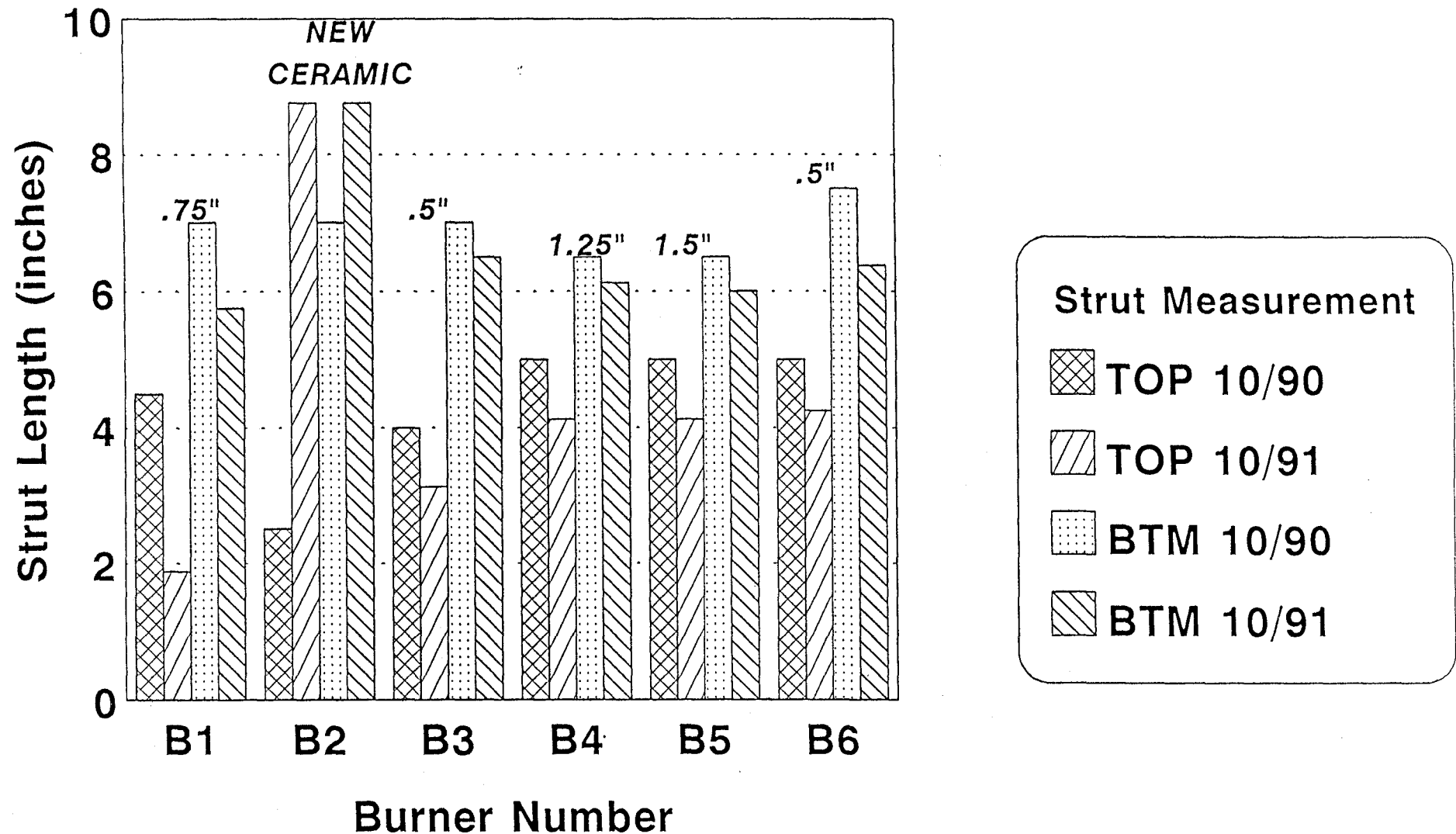
Sheet 5 of 5

Equipment <u>Burners and Windbox</u>		Unit # <u>2</u>	Test/Inspect. Date <u>Oct. 27-28, 1991</u>
Inspector <u>Cecil James</u>		Responsible Engineer (Initials) _____	
Item or Test	Observations/Comments	Recommendations	
D2	3/4" hole in cone. Top: 4-1/2", Bottom: 5-1/2" Restrictor changed to 18" ID.		
D3	1/4" hole in cone. Top: 4-1/2", Bottom: 5-3/4" Restrictor changed to 18" ID.		
D4	Ceramic diffuser. Top: 8-1/2", Bottom: 8-5/8" Restrictor changed to 18-3/4" ID.		
D5	5/8" hole in cone. Top: 3-1/4", Bottom: 5-1/2" Installed new 20" ID restrictor.	New diffuser 11/91	
D6	Spin vanes are bound up. Broken ceramic diffuser. Top: 8-1/2", Bottom: 8-5/8"	New nozzle 11/91 New diffuser 11/91	

IP7_004581

UNIT 2 BURNER DIFFUSER MEASUREMENTS

Taken October, 1990 and October, 1991
Wear Monitoring



**Numbers above bars indicate size of hole in cone

INTERMOUNTAIN POWER SERVICE CORPORATION

Engineering Test and Inspection Sheet

Sheet 1 of 1

Equipment <u>Burners and Windbox</u>		Unit # <u>1</u> Test/Inspect. Date <u>April 11, 1992</u>
Inspector <u>Cecil James</u>		Responsible Engineer (Initials) _____
Item or Test	Observations/Comments	Recommendations
<u>Unit 1 burner work is identified as capital project IGS91-3.</u>		
<u>New Burners Installed</u>		
	All Unit 1 burners were replaced with new B&W burners including new diffusers, deflectors, and nozzles. The new burners have the fundamental design features of the original burner design with the following exceptions:	
	<ol style="list-style-type: none"> 1. The outer register back plate is segmented to allow movement as thermal stresses rise. 2. All burner parts are 309 stainless steel except the outer register front plate which is 304 stainless steel. 3. All burner parts exposed to radiant heat was designed thicker to provide more rigidity. 4. A second support channel was added to the outer register back plate and one to the outer register front plate. 5. Linkages to the outer register vanes and the inner air spin vanes are a heavy duty (HD) type. The HD type linkages used on the original burners were reliable and required little maintenance. 6. A single angle brace from the top of the outer register back plate to the burner casing was installed to prevent the outer register back plate from deforming backwards. 7. A second observation port was placed in the outer air zone. The scanners in the F row were installed in these new ports to see if flame detection could be improved. 	
<u>Old Burner Condition</u>		
	The original burners removed from the windboxes incurred extensive nozzle damage particularly G, B, and E burners. See photos 1 - 6. These burners never gave any indication of nozzle fires while in service and the nozzles show limited oxidation. Other burner components show little damage since the last outage.	
<u>Flyash Accumulation in Windbox</u>		
	Flyash accumulation in the B, A, G, and H windboxes appear greater than normal. See photos 7 and 8.	
<u>Burner Isolation Gates</u>		
	All burner isolation gates were removed for burner work. Most gates failed to retract completely from the coal path in the 100 percent open position which resulted in gate and gate-seat wear, see photos 9 and 10. The erosion on the gates prevented a complete seal when the gate was 100 percent closed, see photos 11 and 12.	
<u>Air Flow Tests</u>		
	Adjustable shrouds were placed across the outer registers and back plates were tuned in conjunction with data from Air flow tests on the inner and outer secondary air zones. Results show air flow improved to ± 10 percent maximum deviation from burner to burner.	

IP7_004583

INTERMOUNTAIN POWER SERVICE CORPORATION

Engineering Test and Inspection Sheet

Sheet 2 of 2

Equipment <u>Burner and Windbox</u>		Unit # <u> </u>	Test/Inspect. Date <u>April 11, 1992</u>
Inspector <u>Cecil James</u>		Responsible Engineer (Initials) <u> </u>	
Item or Test	Observations/Comments	Recommendations	
<u>Burner Line Restrictors</u> Certain burner line restrictors were scheduled for modification in an effort to balance primary air flow, photo 13. 23 restrictors were selected but only nine were completed. Asbestos gaskets were found in some restrictor joints, see photo 14. Since no one was prepared for an asbestos abatement procedure, the restrictors that were disassembled were re-installed in it's original location.			
Completed restrictor work was limited to the following:			
<u>Burner Line</u>	<u>Old Restrictor Size (ID inches)</u>	<u>New Restrictor Size (ID inches)</u>	
A1	21	20	
A4	21	20	
C4	21	19	
C5	21	20	
D1	17.5	18	
D5	21	20	
G4	18.38	18	
G6	18.38	18	
H3	21	20	
All further restrictor work will be scheduled to coincide with future pulverizer maintenance.			

IP7_004584

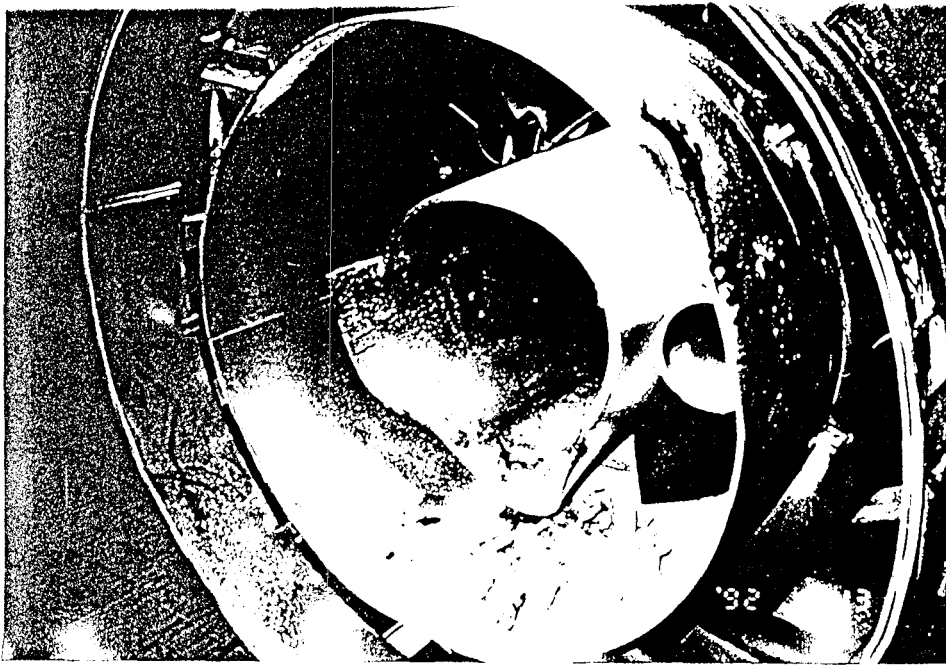


Photo 1: B Row Burner Deformation

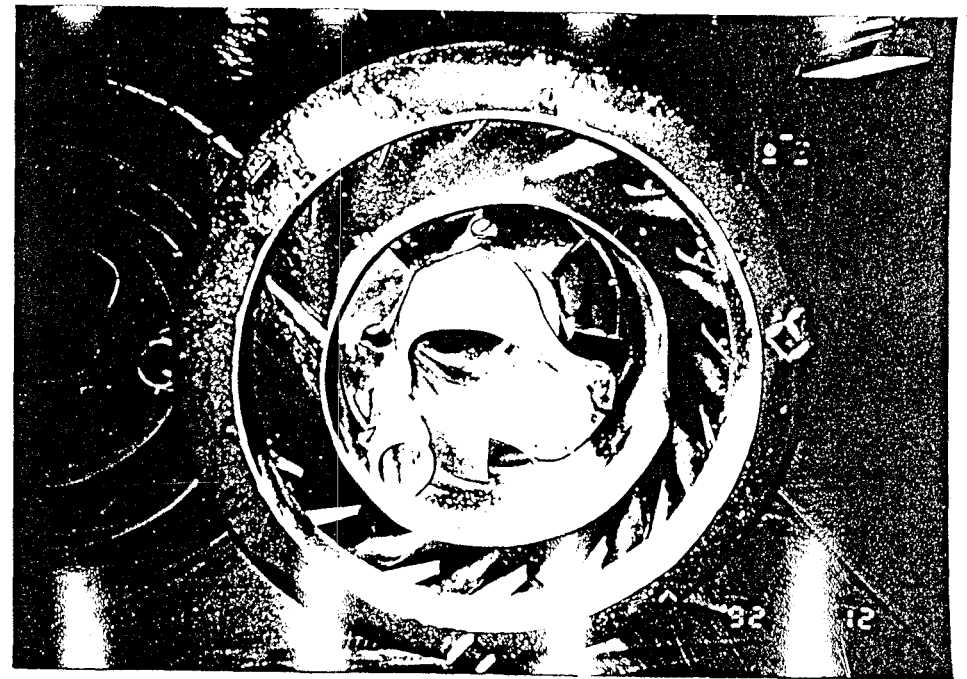


Photo 2: G Row Burner - Severe Nozzle Deformation

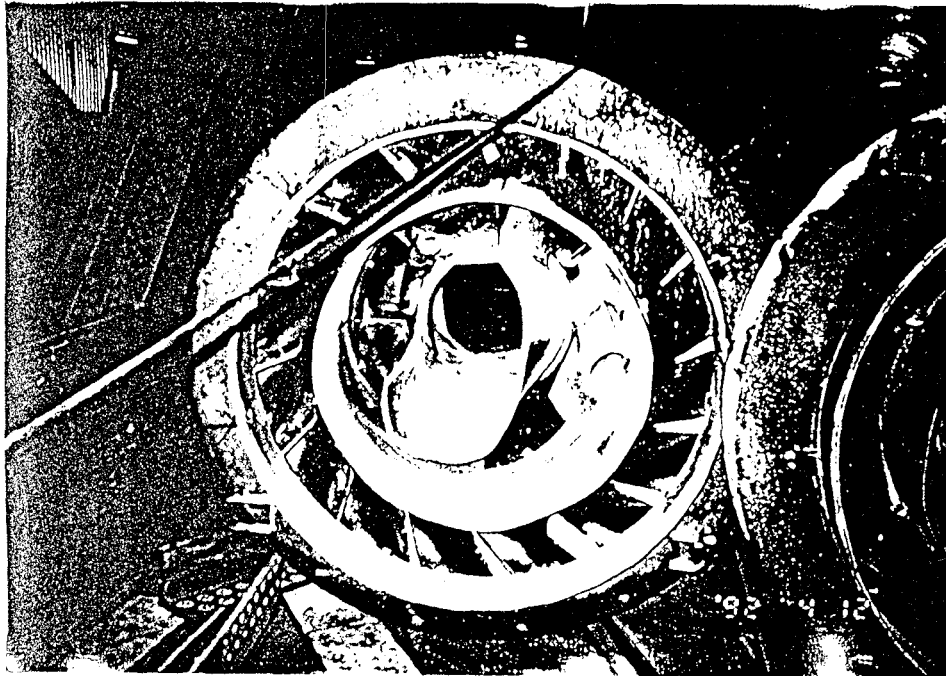


Photo 3: G Row Burner - Severe Nozzle Deformation

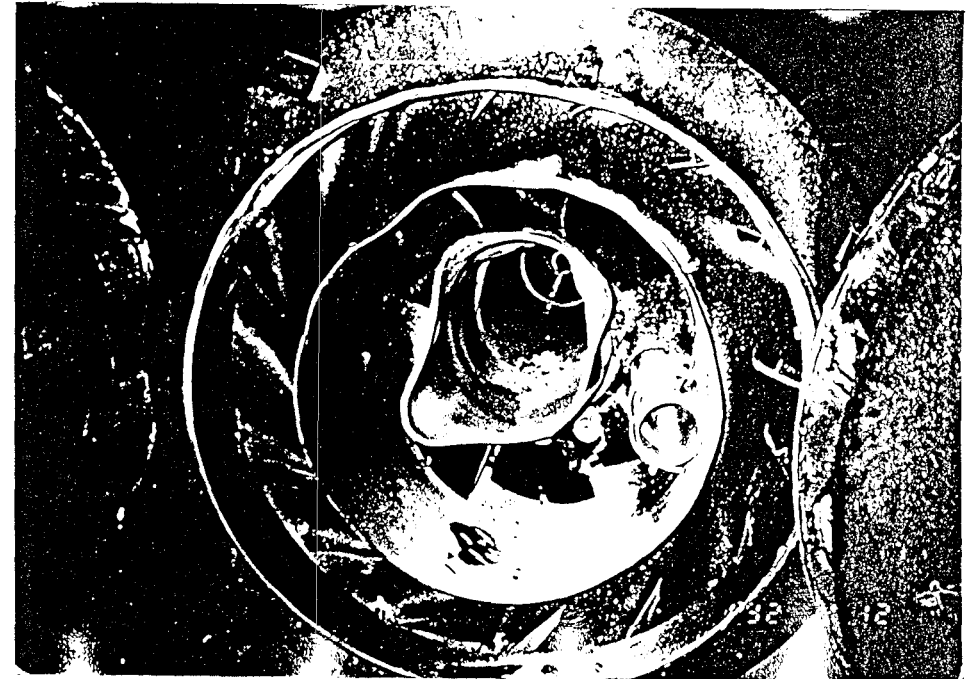


Photo 4: G Row Burner - Severe Nozzle Deformation



Photo 5: Severe Nozzle Deformation

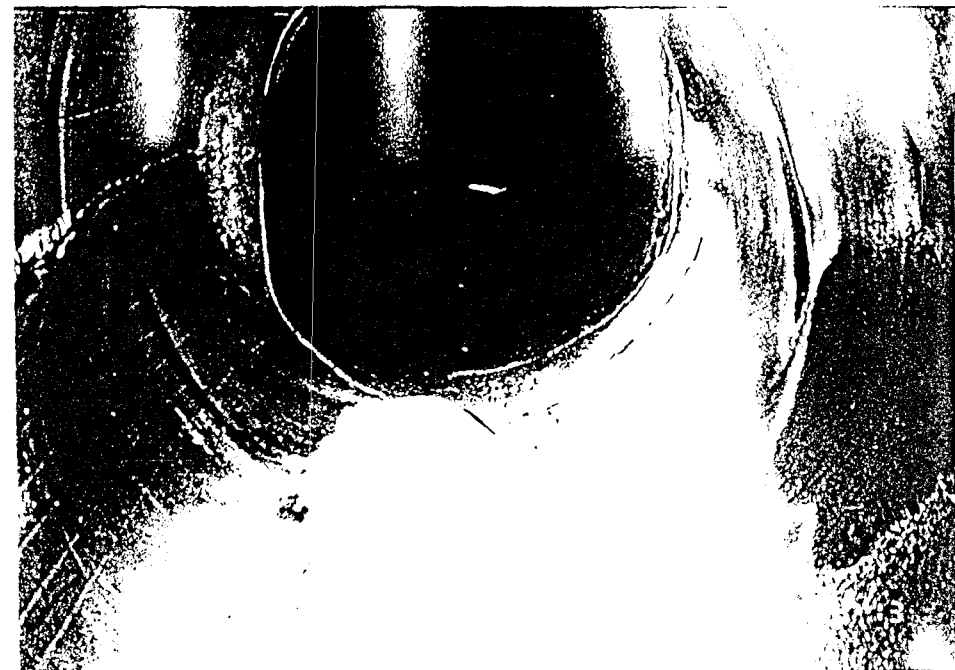


Photo 6: Severe Nozzle Deformation

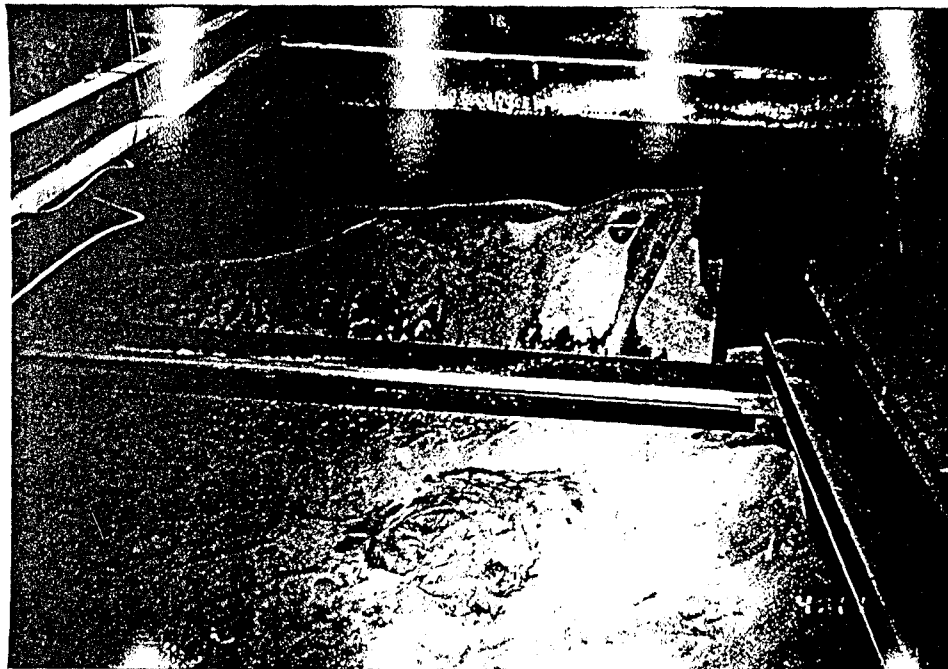


Photo 7: Flyash Accumulation - A Row

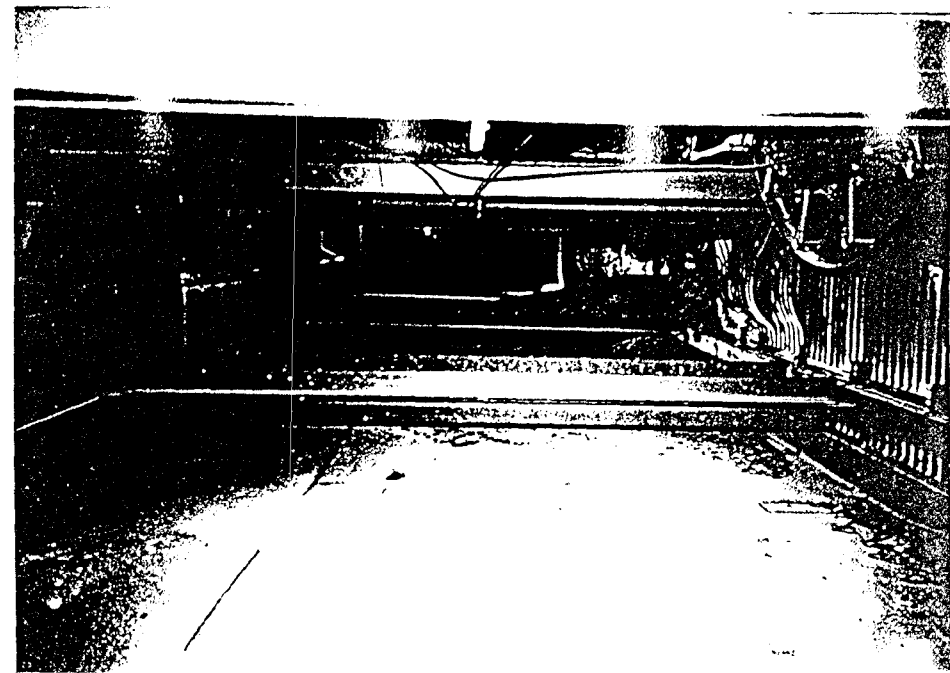


Photo 8: Flyash Accumulation - B Row

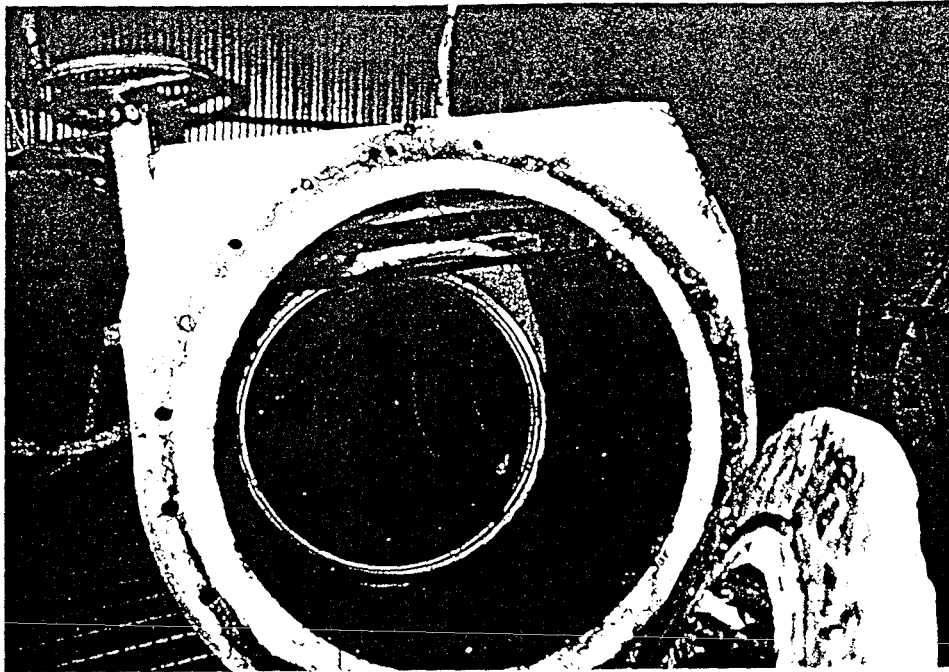


Photo 9: Isolation Valve - Gate Open But Still in Coal Path

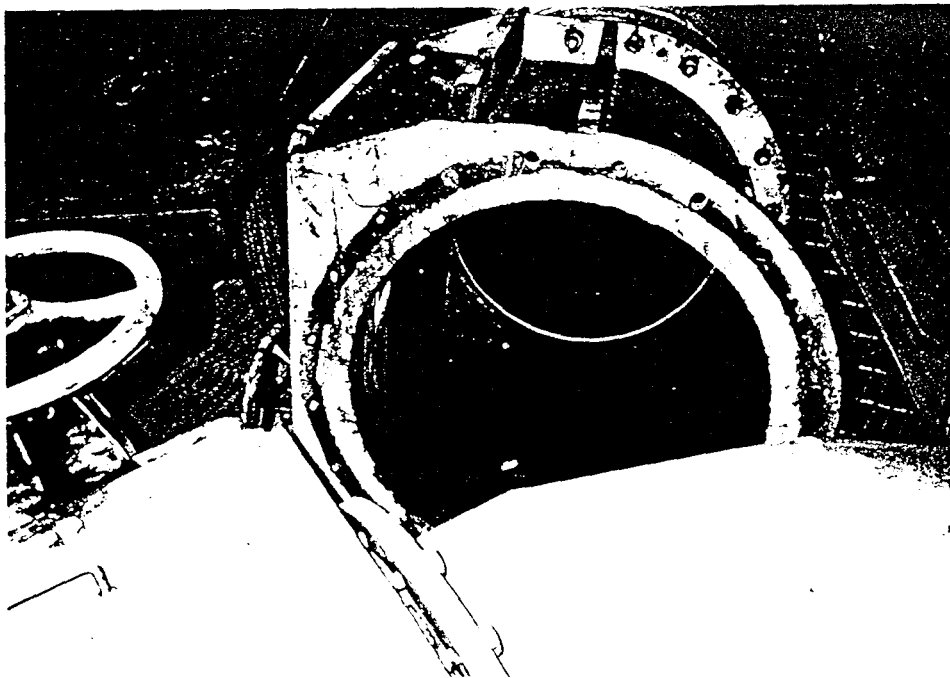


Photo 10: Isolation Valve - Gate Open But Still in Coal Path

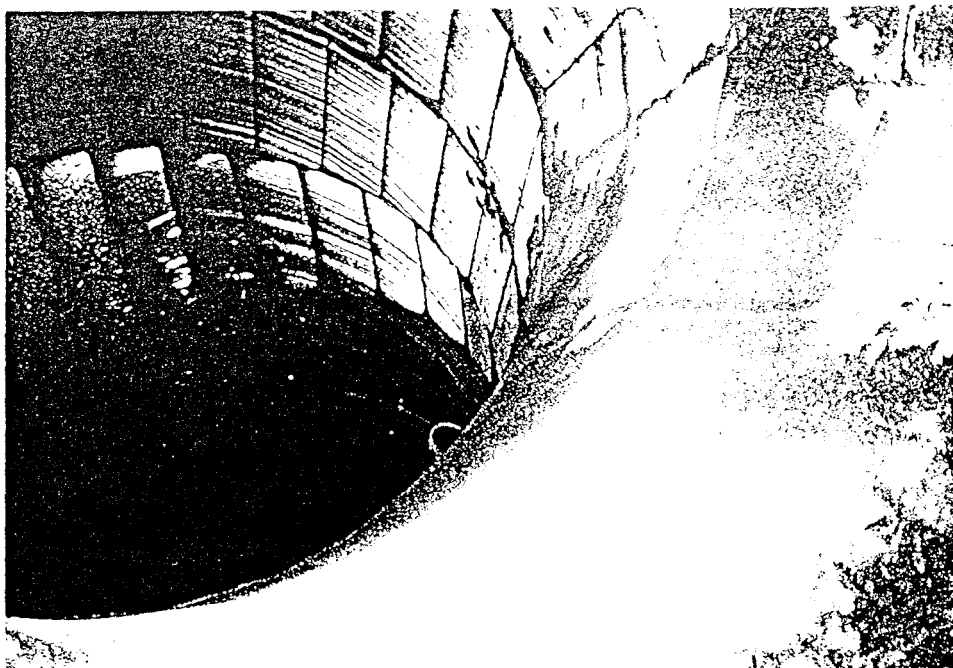


Photo 11: Isolation Valve - Gate Will Not Close Completely

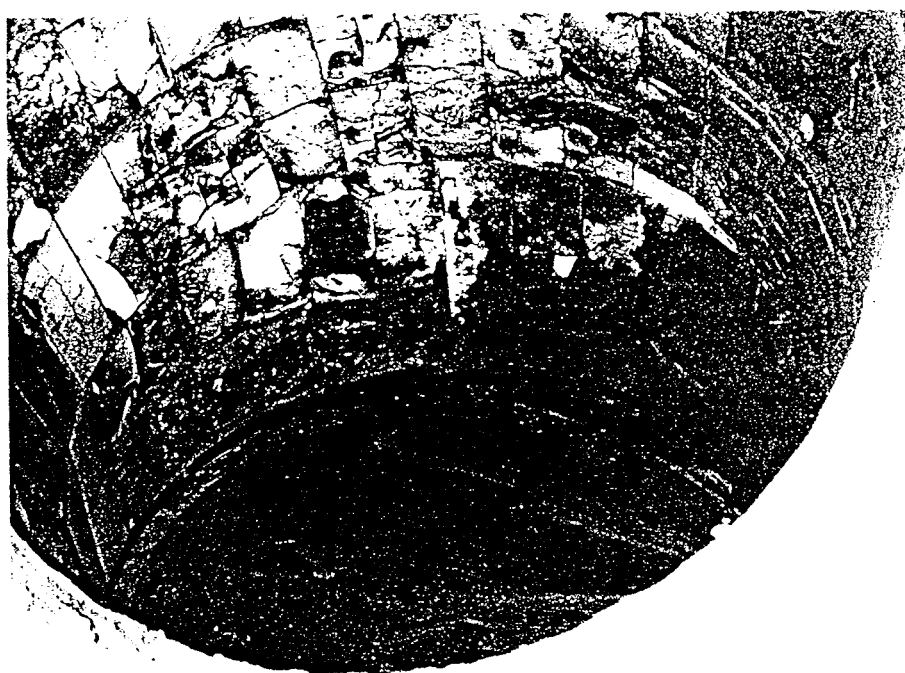


Photo 12: Isolation Valve - Gate Will Not Close Completely

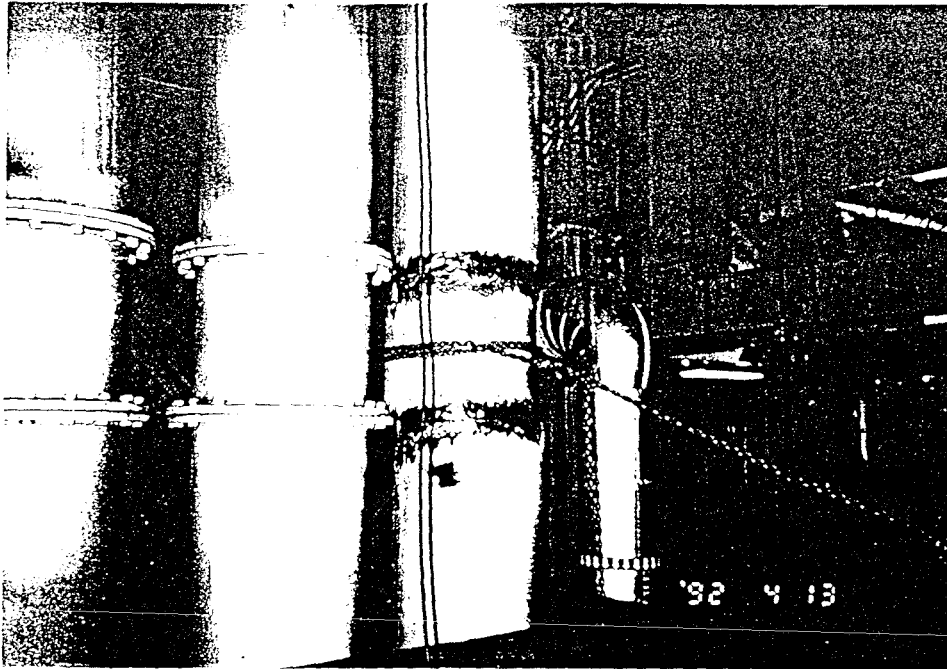


Photo 13: A1 Restrictor Installation

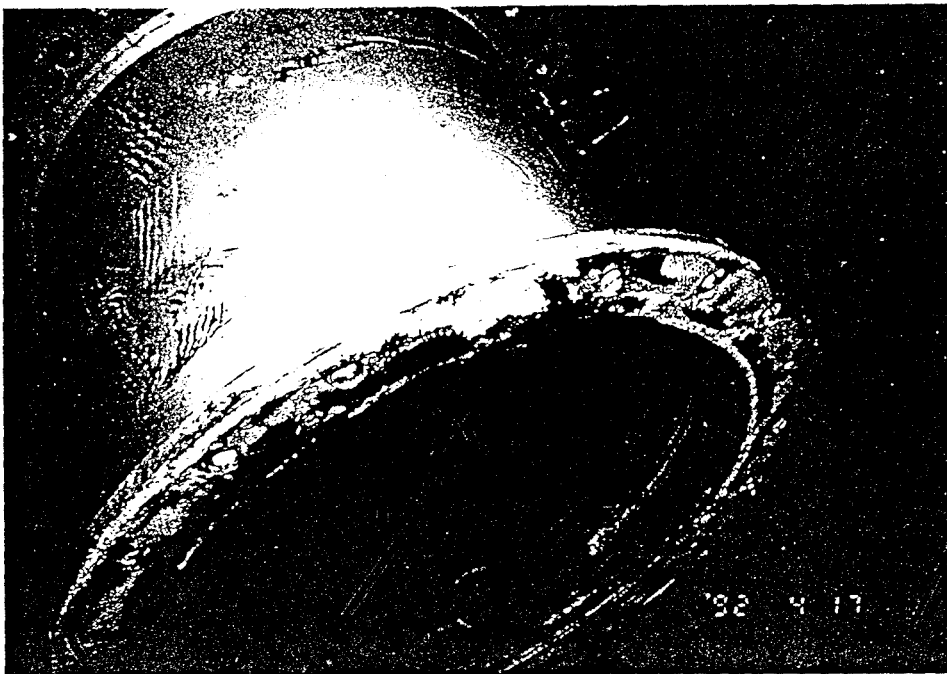


Photo 14: Asbestos Gasket - D4 Restrictor